R. P. Dow

ACTIVITIES REPORT

VECTOR CONTROL AND INVESTIGATIONS BRANCH

OCTOBER - DECEMBER, 1951

Federal Security Agency
Public Health Service
Communicable Disease Center
Atlanta, Georgia

NUMBER 1

Many of the trends and observations contained herein are of a preliminary nature and studies are continuing. Material in this report is not for publication or release in articles for publication without authorization.

CONTENTS

GENERAL AND ADMINISTRATIVE ACTIVITIES

The Vector Control and Investigations Branch was officially organized on October 5, 1951, by order of the Medical Director in Charge. The components of the new Branch were formerly the Engineering and Entomology Branches and the plague studies and investigations in the West and Hawaii which were under the jurisdiction of the Laboratory Branch. The Branch is composed of the Office of the Chief and seven Sections. Dr. George H. Bradley was designated as Chief, Mr. Chris A. Hansen, Deputy Chief, and Mr. John S. Wiley, Assistant Chief (Operations). The Position of Assistant Chief (Investigations) has not, as yet, been filled. The Sections and Section Chiefs are as follows:

Fly Control and Investigations - Mr. J. H. Coffey
Malaria Investigations - Mr. M. H. Goodwin
Mosquito Control and Investigations - Mr. R. F. Fritz
Plague Investigations (San Francisco) - Dr. V. B. Link
(Dr. Link will be replaced by Mr. Frank M. Prince on February 1, 1952.)
Rodent Control and Investigations - Dr. Carl O. Mohr
Thomasville Field Station - Dr. Dale R. Lindsay
Water Resources (Salt Lake City) - Dr. Stanton J. Ware

Integration of the activities of the former headquarters Engineering and Entomology Branches has been accomplished with little difficulty as close liaison had been maintained between the two Branches in the past. In November, the physical transfer of personnel and office equipment was completed, and by the end of the quarter the new Branch was functioning as a unit.

Administrative

In cooperation with the Supply Section of the Administrative Branch, surveys of surplus and unserviceable automotive and other equipment in States where the residual spray program had been operated were completed and arrangements made for the disposition of surplus and unserviceable items.

Integration of the files of the former Engineering and Entomology Branches is in progress. A subject-numeric system is being used which promises to be very satisfactory for our purposes. Various administrative procedures were approved by the Branch Chief and Section Chiefs, and all personnel were furnished copies of the new procedures. A central source for Branch office supplies was established to decrease the number of requisitions submitted to the Supply Section.

Mr. Emerson R. Baker was transferred to the Branch on January 1, 1952, from the Executive Office and appointed Administrative Officer.

Disaster Aid and Facilities Planning

In December, Sanitary Engineer (R) Porter A. Stephens was placed in charge of disaster aid and facilities planning activities of the Branch, replacing Sanitary Engineer Director Frank R. Shaw who was

transferred to Region I CDC activities. Mr. John P. Zurlo was assigned to assist Mr. Stephens.

Disaster Aid: The disaster aid equipment formerly located in Kansas City, Kansas, was transferred to the Topeka Field Training Station. Other equipment on loan in the Kansas-Missouri flood area was returned to points of origin. The transfer of equipment to Topeka completed the establishment of five stockpiling centers for such equipment. The locations and areas served are as follows:

Boston, Mass. (equipment stored at Newton, Mass.) - States in Regions I, II, and IV, except Kentucky
Atlanta, Ga. - States in Regions III and VI, plus Kentucky
Topeka, Kans. - States in Regions V and VII
Dallas, Tex. (equipment stored at Tyler, Tex.) - States in Region VIII
San Francisco, California - States in Regions IX and X.

A preliminary showing of motion picture footage of the Kansas-Missouri flood area, attended by approximately 50 CDC and regional personnel, was arranged in order that suggestions might be made for the improvement of the film for training purposes. A request was made for negatives of pictures relating to flood conditions and post-flood activities from those who participated in flood work in the Kansas-Missouri area. The pictures will be used in developing training aids.

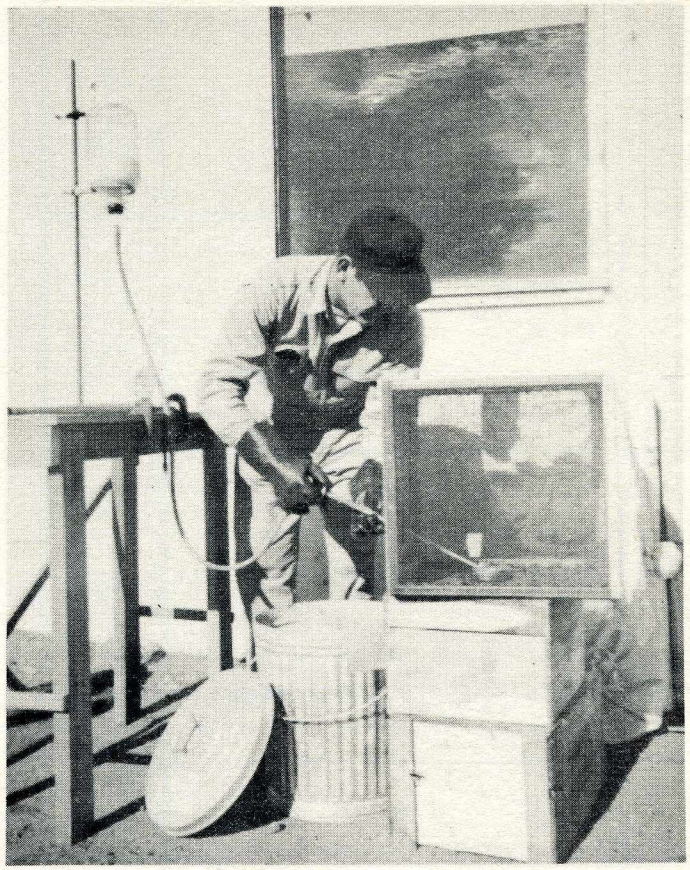
A tentative draft of a brochure on airplane application of insecticides, which will be included in the epidemic and disaster aid manual series, was completed. A revision of the chapter, "Mosquito Control Following Epidemics and Disasters," was made and reproduction is underway.

CDC Building: Work on building plans during the quarter consisted chiefly of consultation with the architects and the Laboratory and Audio-Visual Production Branches regarding disinfection, furniture and service layouts of laboratory units, and power demands.

FLY CONTROL AND INVESTIGATIONS

The release of the film strip "The Biology of Domestic Flies" marked the sixth in a series of seven films dealing with flies and fly control, produced by the Audio-Visual Branch in cooperation with this section. Now in preparation is the last film in the Community Fly Control Series, "Community Fly Control." This is the composite treatment of the six different elements presented in the films number 1-6 plus coverage of educational and planning phases of a fly control program.

A photographic duplicate of the Fly Control Exhibit has been prepared for field usage. In addition, 25 reproductions of the same exhibit in book form are being processed for distribution to Regional offices and project personnel for training and promotional activities.



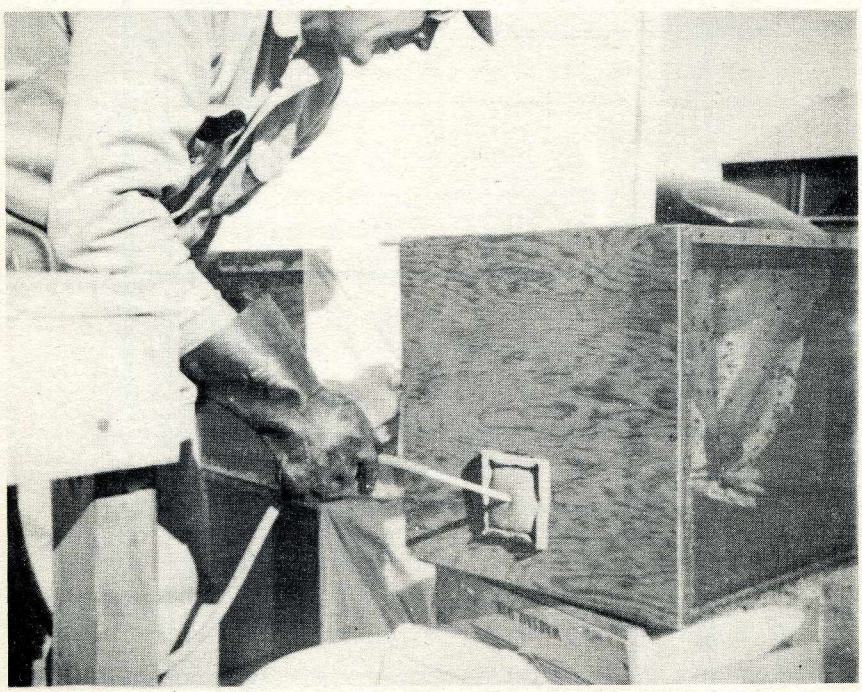


Figure 1

Apparatus for Introducing Radioactive Milk into Fly Feeding Tins

FSA - PHS - CDC ATLANTA, GA. FEB, 1952

FSA - ATLANTA, GA.

TABLE I

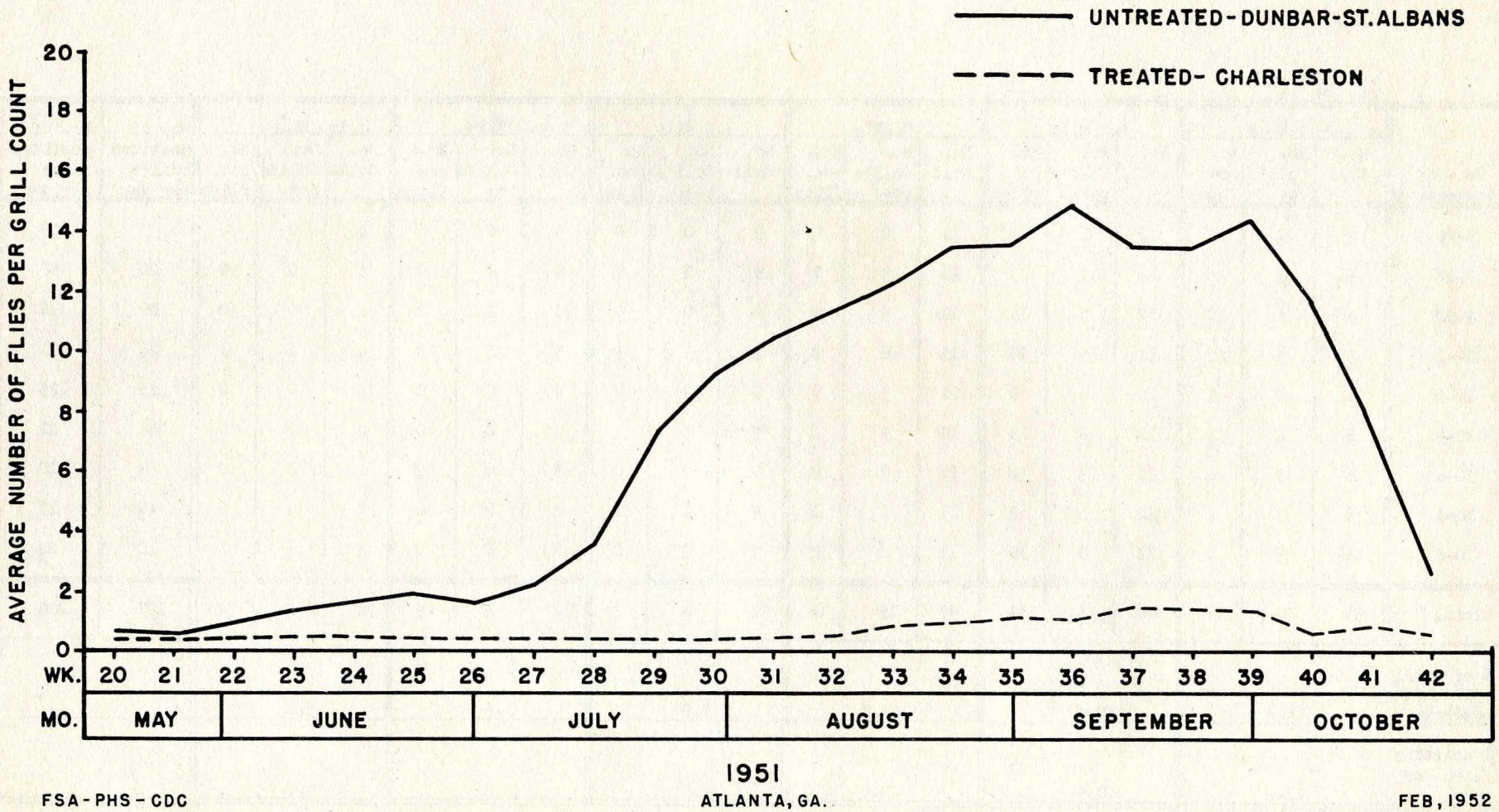
Number of positive collections and tagged house flies per zone.
Flight Range Studies - Phoenix, Arizona
September 1951 test.

Date of Collection	0.5 Mile			1.0 Mile			2.0 Mile			3.0 Mile			4.0 Mile			5.0 Mile			No. of positive coll's per day	No. of positive flies per day
	No. Coll.	No. Coll's pos.	No. pos. flies	No. Coll.	No. Coll's pos.	No. pos. flies	No. Coll.	No. Coll's pos.	No. pos. flies	No. Coll.	No. Coll's pos.	No. pos. flies	No. Coll.	No. Coll's pos.	No. pos. flies	No. Coll.	No. Coll's pos.	No. pos. flies		
9-26	6	2	8	12	1	1	11	0	0	9	0	0	8	0	0	4	0	0	3	9
9-27	6	5	25	11	11	25	11	3	7	9	1	1	8	0	0	4	0	0	20	58
9-28	6	5	10	12	7	14	11	5	8	9	0	0	8	2	2	4	0	0	19	34
10-1	5	5	46	11	9	30	11	6	8	9	3	3	8	2	3	4	1	1	26	91
10-2	6	2	7	12	6	9	11	5	7	9	2	2	8	0	0	4	0	0	15	25
10-3	6	4	4	12	8	13	11	3	4	9	1	1	8	0	0	4	0	0	16	22
10-4	6	3	4	12	3	6	11	0	0	9	0	0	8	0	0	4	0	0	6	10
10-5	6	3	4	12	5	7	11	1	1	9	1	1	8	0	0	4	0	0	10	13
10-8	6	3	9	12	6	10	11	2	2	9	0	0	8	0	0	4	1	1	12	22
Total	53	32	117	106	56	115	99	25	37	81	8	8	72	4	5	36	2	2	127	284
% of zonal collections positive		60.4			52.8			25.3			9.9			5.6			5.6			
% positive flies per zone		41.2			40.5			13.0			2.8			1.8			0.7			

FSA-ATLANTA,GA.

Figure 2

Fly grill densities in the treated city of Charleston, W.Va., as compared with those in the untreated cities of Dunbar – St. Albans. Based on 3 week moving averages



1951

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Poliomyelitis Investigations - Fly Control Program

Phoenix, Arizona: Cooler weather during October and November resulted in a general decline in fly activity although counts at specific dump blocks remained at relatively high magnitudes. In all sections of the city, the fly densities dropped to and remained at minimum levels. These trends were in contrast to the general upward swing in prevalence encountered in the untreated city in November.

A second survey of fly breeding in garbage cans was conducted over the same areas covered by a similar operation in June. Results showed a general increase in the percentage of infested cans throughout the various sections of Phoenix. Of the 1,955 garbage containers inspected, 6 per cent were positive for fly infestation in the November survey as compared to only 2.6 per cent in the June inspection; however, temperatures in the fall were presumed to be the factor responsible for the augmentation in breeding.

Major steps were taken to remedy the industrial waste fly breeding problem by the establishment of a fly control committee within the Vegetable Growers' Association. Representatives of city and county health units participate in the meetings of this committee. Action has been taken to control the indiscriminate dumping of vegetable culls and to develop improved methods of converting cull wastes to stock feeds.

The second fly dispersion test using house flies tagged with radioactive P-32 was conducted in September. Modification in techniques included a revised trapping pattern, a shift in the location of the release site and an improved method of introducing the radioactive milk into the holding cages (Figure 1). Approximately 56,000 house flies were released in a substandard residential area 0.5 mile southeast of the business portion of Phoenix. Collection sites were distributed in concentric bands at distances of 0.5, 1, 2, 3, 4 and 5 miles from the liberation point. Selection of each trap station was based solely upon the attractive value of the site for house flies and without any attempt to maintain a uniform distance interval between adjacent traps on the same ring.

Results of the foregoing test (Table I) disclose dispersion of Musca domestica through the area and up to distances of 4 and 5 miles. More than 81 per cent of the tagged flies recovered came from within the 0.5 and 1 mile zones. All stations on the 0.5 and 1 mile bands yielded tagged specimens, while the percentage of positive stations per band at 2, 3, 4 and 5 miles ran 72, 44, 37, and 25, respectively.

The capture of a significant number of marked specimens at stations (including the market area) in the business section, demonstrated that flies were moving into the city from an area characterized by insanitary privies or exposed human excreta, thus serving as a possible transmission vehicle for pathogens available at these substandard sites.

In brief, the data for the two dispersion studies in Phoenix in 1951 show:

(a) The principal zone of house fly dispersion is within one mile of the release site, more than 81 per cent of the tagged flies in both tests being recovered on the 0.5 and 1 mile bands.

(b) Despite recovery of marked flies at 3, 4 and 5 miles, the numbers retrieved at these distances are too small to warrant emphasis at the present time. However, the 13 per cent recovery on the 2.0 mile band in the September test indicates that movement to this distance may be significant.

(c) Movement of house flies is rapid. Tagged specimens were recaptured at distances of 0.5 and 1 mile within 24 hours, the wave of dispersion spreading to 2 and 3 miles within 48 hours and to 4 miles within 72 hours.

(d) The major factor governing the dispersion pattern is the attractivity (for feeding and breeding) of the area for house flies. Where a site is surrounded by attractive stimuli of "equal" value, dispersion can follow a random design. Where these attractivity values are unequal, this radial dispersion is channeled along the paths of greater fly attractivity.

The privy sampling program for determining the types of flies produced therein was continued throughout the second quarter. Samples of excrement from untreated privies yielded mixed populations of M. domestica, Stratiomyidae, and Muscina whereas those from dieldrin-treated structures produced predominantly house flies.

Charleston, West Virginia: The termination of control activities in October marked the end of the second year of successful fly abatement (Figure 2). In retrospect the principal disturbing factor in the 1951 season was the initial appearance of house fly resistance to dieldrin in the Charleston area. Evidence indicates the resistance to be greatest at those sites receiving repeated applications of dieldrin.

In recognition of the obvious benefits derived from recommendations made subsequent to the 1951 survey, of refuse handling practices in Charleston, the city of South Charleston requested project personnel to make similar analyses of their own refuse collection system.

In December, all sewage, privy, and fly specimens (plus epidemiological blood specimens) collected during calendar year 1951 were shipped to Dr. J. L. Melnick at Yale University for virological examination.

Preliminary processing of data from citywide larval surveys in Charleston show that household garbage is the most frequently occurring source of fly breeding, accounting for 49.5 per cent of the positive substrates detected. Other important sources were meat wastes (13.8 per cent) and various types of animal excrement, the most common being

chicken droppings (9.7 per cent). Major species reared from meat wastes were the blowflies Phaenicia and Phormia, while chicken excrement produced Ophyra leucostoma and Musca domestica. Sarcophaga occurred predominantly in dog stools.

In conformity with data from larval surveys in Topeka, Kansas, and Phoenix, Arizona, a comparison of the flies infesting scattered garbage and garbage in containers showed blowflies (Phaenicia spp.) to be the predominant inhabitant of the latter while Musca domestica was the most frequently occurring species in scattered garbage.

Preliminary results from the privy sampling surveys for fly breeding reveal that in Charleston, an area characterized by a predominantly blowfly population, the house fly is able to breed successfully in human excrement in privies.

Diarrhea-Dysentery Fly Control Programs

Arizona: At the Casa Grande project, sewer extensions resulted in elimination of numerous fly breeding privies. Progress continued on other phases of the sanitation improvement program.

The city of Flagstaff was designated as the site of the second fly control demonstration project for the State and operations began in December with the sanitary survey.

New Mexico: Improvement in sanitation practices continued to be stressed at the Carlsbad and Las Cruces projects. The purchase of a 20 cubic yard packmaster has enabled the city of Carlsbad to extend the twice-weekly refuse pickup schedule to the entire community. Another forward step is the removal of 75 per cent of the privies through the extension of sewers into substandard areas of West Carlsbad. At Las Cruces, the initial grabage can tagging campaign was put in effect in October. At the close of the year a program review of the fly control project was presented to the Las Cruces City Council and Mayor.

Texas: The demonstration power of the original fly control projects (Seguin, Sinton-Taft) combined with the training activities of the Fly Control Short School has resulted in a considerable expansion of the original program. To date, eleven cities (Mathis, San Marcos, Atlanta, Olney, Big Springs, Kingsville, Corpus Christi, Daingerfield, DeKalb, Bastrop, Midland, and Odessa) have adopted the complete operational programs. All of these cities operate under local sponsorship with technical guidance from the State level.

Kentucky: At the Harlan project, the refuse collection system survey was completed and a detailed report prepared for presentation to city officials.

The cities of Hazard and Central City report satisfaction with the first year of operations of their locally sponsored fly control programs. Plans have been made for initiating city sponsored programs in Drakesboro and Greensboro also.

Plans are currently in preparation to provide special fly control training for area sanitarians of the State health department to extend fly control programs into 10 more cities.

MALARIA INVESTIGATIONS

Surveys for detection of malaria, measurements of Anopheles populations, and special studies were continued at the Malaria Investigations Stations. Activities at the Helena, Arkansas, station were terminated at the end of October because of fiscal limitations. Work at the Manning, South Carolina, and Newton, Georgia, stations is summarized below.

Manning Field Station

Epidemiological work: Blood films were collected monthly from about 85 percent of the population of 1,882 in the experimental area. A total of 4,771 slides was submitted to the laboratory for examination. No cases of malaria were detected.

Biological work: Weekly indexes of anophelines, already low because of the drought, dropped to zero with the onset of cold weather.

A study was made of records obtained from 33 adult mosquito index stations used in 1951 in an attempt to find reasons for the relatively high counts of Anopheles quadrimaculatus and Anopheles crucians observed in some of the stations when counts were low in other stations. Such factors as number and size of animals kept in the stable, condition of the building, distance from and size of breeding area, and the influence of larviciding on the adjacent breeding area were considered. In each case it was found that plausible explanations could be made for the records for a particular station. Especially high counts could be attributed to a combination of several favorable circumstances.

An investigation of types of winter resting places of anophelines in the area, which was begun last year, was resumed in December. Hollow trees were fumigated and the number of mosquitoes collected was tabulated.

Because rainfall was far below normal for many months, the Santee-Cooper Reservoir bordering the study area fell to a record low level. Plant growth was profuse in the extensive acreage previously submerged. A study was made of the aquatic and semi-aquatic flora in and around the reservoir. This was done in recognition of the possibility of a marked increase in anopheline breeding next season if the water rises into this new growth.

Dissections of wild-caught specimens of A. quadrimaculatus and A. crucians were virtually terminated in October. Nearly 3,000 A. crucians were dissected in 1951 and 2 of these were observed to harbor sporozoites in the salivary glands. Of the 8,500 A. quadrimaculatus examined, 3 were found positive. (Table 2) Inoculations of the unknown

sporozoites into canary, chick, and sparrow did not produce infections. Although none were attempted this last year, numerous trials with human volunteers were negative in previous investigations involving the unidentified sporozoites.

Table 2

Routine Dissections of Wild-caught Anopheles
Manning Field Station

	Total for December	Total for Quarter	Cumulative Total - 1951
No. crucians dissected	0	101	2,854
No. crucians with sporozoites	0	0	2
% crucians with sporozoites	0	0	0.07
No. quads dissected	0	494	8,424
No. quads with sporozoites	0	0	3
% quads with sporozoites	0	0	0.04
No. punctS dissected	0	11	85
No. punctS with sporozoites	0	0	0

Experimental studies on malaria sporozoites were extended. Plasmodium relictum, a species of bird malaria, was maintained in English sparrows for this purpose and Culex mosquitoes were fed on infected birds. In a study of the number of sporozoites required to produce a malaria infection, it was observed in three of eight canaries that injections of comparatively small numbers of sporozoites produced parasitemias while with massive quantities of sporozoites, infections resulted in almost all instances.

In connection with the investigations of the unidentified sporozoites, found in wild-caught Anopheles, studies on Leucocytozoon andrewsi in the domestic chicken were advanced. This parasite could, conceivably, be the source of the unknown sporozoites. Efforts to find the vector of L. andrewsi were delayed because of a lack of heavy infections for feeding experiments. Observations on several score fowl, mature and young, did not disclose more than a few parasites in any single blood film. Only a few immature chickens were positive and these had light infections.

Newton Field Station

Epidemiological work: No cases of malaria were observed in the experimental area; blood films collected from 22 persons that exhibited symptoms of malaria and from 421 asymptomatic individuals were negative for malaria parasites.

Several locations in Dougherty County, Georgia were selected as sites for studying causes of the local recession of malaria. These locations are the areas served by specific rural schools and were chosen

because of the length of records available from annual blood-film surveys.

Biological work: Drought conditions persisted through October but were relieved by excessive precipitation in November and December. Abundant populations of Aedes and Psorophora were produced in the gradually filling ponds but punctipennis was the only Anopheles collected.

In the insectary, colonies of Aedes, Culex, and domesticated Anopheles were maintained for various experimental studies. To assist with interpretation and validation of field observations, investigations on the effect of temperature on Anopheles development were continued. To supplement the information obtained previously on survival of immature stages at different temperatures, larvae were exposed to extreme conditions of temperatures and survival of the different instars observed. Preliminary results suggested that third instar larvae were better able to withstand adverse conditions of temperature than were other stages.

Other temperature studies involved investigation of the effect of temperatures, above and below the optimum range, on viability and hatching time of ova. At 104 degrees F. about 50 percent of Anopheles quadrimaculatus ova failed to hatch after 4 hour's exposure; at 44 degrees about half of the ova would hatch after 14 days exposure. This indicates that larval development proceeds below the usually accepted limit of 50 degrees.

Since the larval studies indicated that immature A. quadrimaculatus are able to develop under existing winter conditions, investigations were started to learn the effect of temperature on development of ova in the adult mosquito. Ova were obtained in 8 days when adult A. quadrimaculatus were kept at 60 degrees after feeding, in 5 days at 75 degrees, and in 4 days at 90 degrees; ova were not obtained at 95 degrees. Studies of ova development at lower temperatures were in progress at the end of the quarter.

The above studies were conducted under arbitrary laboratory conditions. In order that more definite information could be obtained on development of larvae at current natural temperatures, the following study was begun: ova were removed from the A. quadrimaculatus colony cage each day, beginning November 16, and placed on the exposed, open porch of the insectary. Daily checks were made to observe hatching and the number of larvae of each instar in the bowls. In spite of a freeze and prolonged severe cold, every group of ova was represented at the end of the quarter by living larvae.

Studies on malaria parasites included investigations of the effects of age and density of gametocytes on infectivity to mosquitoes. Using Plasmodium relictum in Culex quinquefasciatus, it was found that age of gametocytes was a more critical factor than density in limiting successful infection of mosquitoes.

Other studies were made of development of malaria parasites in different

lots of mosquitoes kept at various temperatures. Under conditions of these experiments it was found that oocysts of P. relictum failed to develop in C. quinquefasciatus at 60 degrees F. but developed in 6 days at 80 degrees and in 7 days at 74 degrees.

MOSQUITO CONTROL AND INVESTIGATIONS

The Mosquito Control and Investigations Section combines the activities of the former Malaria Control Section (Engineering Branch) and Mosquito Evaluation Section (Entomology Branch) with additional responsibility for the Epidemiological phases of the Malaria Surveillance and Prevention Program. In addition, an Investigations Unit was established.

Considerable time was devoted to revising preliminary plans for the proposed rice-field mosquito investigations in Mississippi and Arkansas and in coordinating the Section plans for the investigations with those of the Technical Development Branch.

Discussions were held with representatives of the Texas State Health Department and preliminary plans were made for a special study of the potential malaria hazard created by Mexican Nationals entering Texas in certain counties bordering Mexico.

In connection with 22 positive cases of malaria reported from the island of Vieques, Puerto Rico, which is utilized by the Navy for training, a conference was held with a representative of the Insular Health Department.

The tentative "Mosquito Control Following Epidemics or Disasters" was revised and a draft of a brochure on airplance application of insecticides was prepared.

Malaria Surveillance and Prevention

Provisional morbidity reports at the end of the quarter listed 6251 cases of malaria during 1951 in the United States. Of this number, 4857 were listed as of military or foreign origin. This latter figure is misleading, however, since it is known that a great many more infected veterans have been returned to the United States than have been reported through the NOVS channels. By the end of December, 806 of the reported cases had been appraised and 533 confirmed as malaria. Only seven of these cases appear to have originated in the United States.

Summaries of the 1951 entomologic evaluation reports were prepared. The number of inspections made this year was far below the number made in previous years. However, the data submitted from the respective States show that DDT applied at the rate of 200 milligrams per square foot is still effective in controlling Anopheles quadrimaculatus inside houses and that an appreciable degree of fly control is obtained by the single seasonal application. Sprayed houses were maintained 99.5% free of malaria mosquitoes as compared to 89.9% in unsprayed houses, with an indicated 94.5% control. The fly density group most often observed

in sprayed houses was 1 to 10, compared to 11 to 50 most often observed in the unsprayed houses inspected. Tables 3 and 4 and Figure 3 illustrate the 1951 mosquito and fly control of the Residual Spray Program.

Table 3

RESIDUAL SPRAY PROGRAM
SUMMARY OF INSIDE HOUSE FLY COUNTS
AVERAGE PERCENTAGES OF INSPECTIONS BY FLY DENSITY GROUPS
0-5 Months after Spraying, 1948, 1949, 1950, 1951

DENSITY GROUP	0 Flies	1-10 Flies	11-50 Flies	51-100 Flies	Over 100 Flies
SPRAYED HOUSES					
1948	25	55	17	2	1
1949	13	47	32	5	3
1950	13	46	34	5	2
1951	14	47	32	5	2
UNSPRAYED HOUSES					
1948	13	42	31	7	7
1949	9	31	38	13	9
1950	5	26	41	18	10
1951	2	27	46	14	11

The regular seasonal residual spray cycle was completed during the preceding quarter; however, 574 applications were made in the current quarter as selective malaria prevention. Field activities were for the most part concerned with the reconditioning and storage of equipment.

Defense-Connected Activities: On request from military authorities, the Provost Marshall at Camp Gordon was provided with data and illustrative material pertaining to the use of aircraft for mosquito control and survey activities.

Conferences were held with Lt. O' Connell and other representatives of an Air Forces' Epidemiological Wing stationed at Gunter Field, Alabama. Preliminary arrangements were made with the Training Branch to conduct a special communicable disease control training course. However, the Wing was ordered out before the course could be given.

SEVEN-YEAR SUMMARY OF ENTOMOLOGIC EVALUATION
OF RESIDUAL SPRAY PROGRAM BASED ON 81,640 INSPECTIONS OF
SPRAYED AND UNSPRAYED HOUSES 1945-1951

	1945	1946	1947	1948	1949	1950	1951	Total or Average
Number of Sprayed Houses Inspected	14,129	21,951	3,794	7,479	8,513	9,435	3,396	73,697
Percentage of Sprayed Houses Free of Anopheles quadrimaculatus in the P.M.	97.2	99.0	98.8	97.2	98.9	99.4	99.5	98.5
Number of Unsprayed Houses Inspected	--	1,639	1,170	1,021	1,311	2,158	664	7,943
Percentage of Unsprayed Houses Free of Anopheles quadrimaculatus in the P.M.	--	87.3	72.0	83.3	91.2	93.3	89.9	86.2
Indicated Percentage of Control	--	92.1%	95.7%	83.2%	88.5%	90.1%	94.5%	91.0%

TABLE 4

PLAGUE INVESTIGATIONS

Dr. V. B. Link, Medical Officer in Charge of Plague Activities was appointed by the California State Health Department to be a member of the Vector Control Advisory Committee.

Correspondence was initiated in response to requests from Rockefeller Foundation personnel in India and the Special Technical and Economic Mission to Thailand for assistance in establishing plague survey projects in these two countries. Detailed information concerning field and laboratory methods was provided.

A half-day training course was given to 15 Navy students from the U. S. Naval Hospital in Oakland, California.

Plague Surveillance

Surveillance was maintained over formerly plague-infected cities. Over 3,000 rats obtained in San Francisco, Seattle, and Tacoma were examined for plague by the injection into guinea pigs of over 10,000 ectoparasites removed from them. Nearly 2,000 rats trapped in San Francisco were autopsied, including 7 rats from vessels entering the port. No evidence of plague was obtained from any of these examinations. The details of this work are presented in Table 5. No case of human plague occurred during this period.

Specimens of ectoparasites and/or tissue were received from: State survey units in New Mexico and Washington and the Santa Fe Field Station. None of the specimens were positive for plague. The details of this work are presented in Table 6.

Santa Fe Field Station

In this quarter mild Fall weather changed to more severe Winter conditions with temperatures reaching freezing or below every night. Activities of the Study Project have been modified to reduce adverse effects on the mammals studied. Mammals formerly able to remain comfortably in traps through the night began in October to suffer from frozen limbs, toes, and tails and occasionally died. Low temperature injuries are now prevented by bringing all trapped animals from the field to the laboratory by 12 M. They are held overnight in the laboratory before being returned to the field the next day.

The study established on the Santa Fe Airport, is still in its preliminary stage, having just completed its first full quarter of operation. From July to the end of the year at the airport study area, 409 individual mammals of 11 species have been captured 1,234 times. Seasonal changes in the mammals' activities and their interrelationships are becoming evident but are not yet completely understood. Table 7 shows the relative abundance of the different species in the area but the species variation in relation to traps also requires consideration.

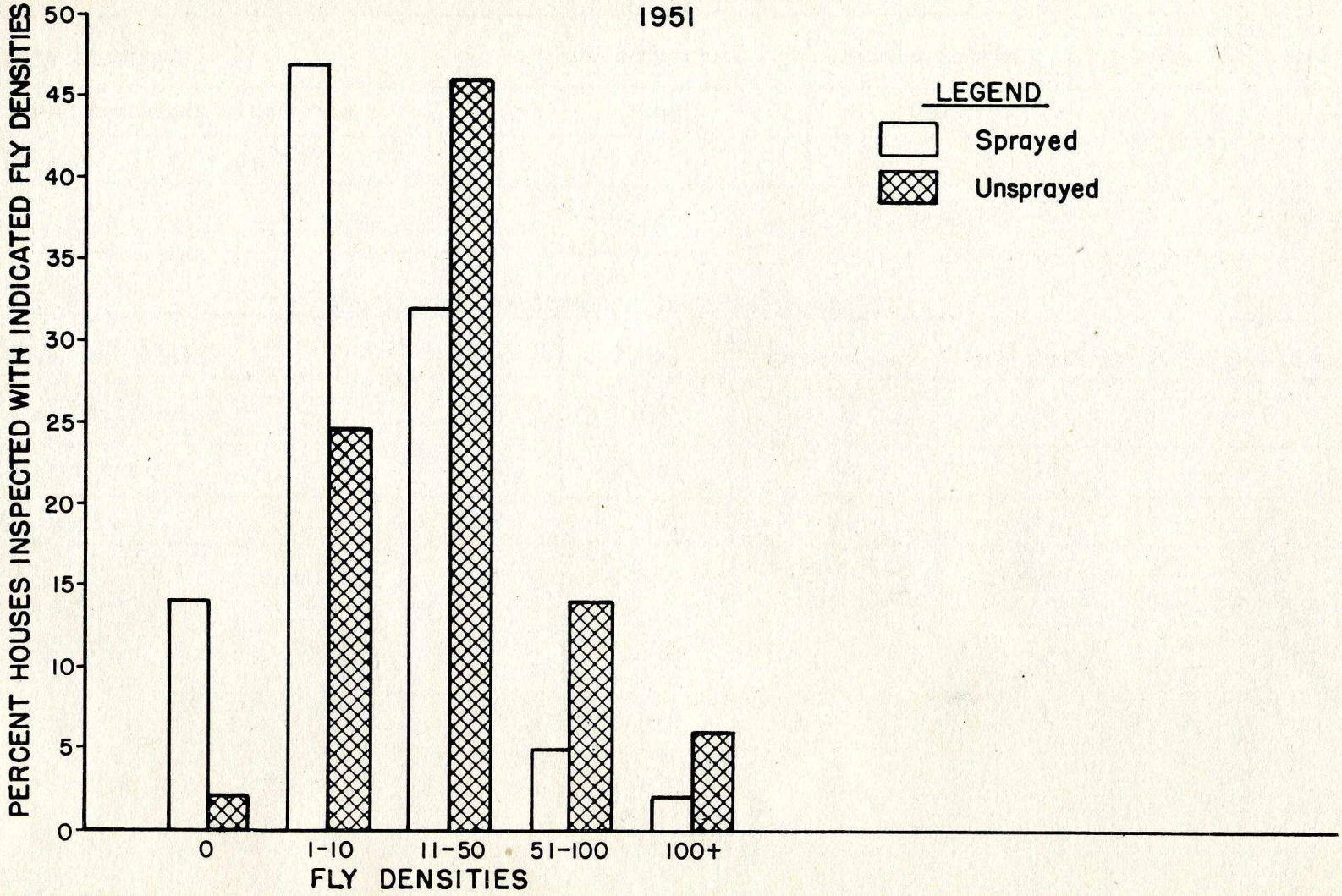
Two species of deer mice, Ord's kangaroo rat and Baird's pocket mouse,

Figure 3

FLY CONTROL ON THE RESIDUAL SPRAY PROGRAM

A Comparison of Fly Densities Inside Sprayed and Unsprayed Houses

1951



FSA-PHS-CDC

ATLANTA, GA.

FEB, 1952

FSA-ATLANTA, GA.

Domestic Rat Examinations
October - December, 1951
Results of Macroscopical-Autopsy Examination

Locality rats obtained	R. Norvegicus	Rattus Rattus	Number with Plague Pathology
Trapped in San Francisco California	1666	241	0
Vessels, entering S. F. Port		7	0
Total	1666	248	0

Results of Ectoparasite Inoculation Tests

Locality Rats obtained:	Rats	Fleas	Specimens	Inoculations	Plague-Infected
San Francisco, California	1914	7092	146	167	0
Seattle, Washington	405	1264	95	96	0
Tacoma, Washington	1008	2184	74	77	0
Total	3327	10540	315	340	0

TABLE 5

Summary Showing Number of Rodents and Material for Laboratory

Testing by the Plague Laboratory for State Health Units and Others

October - December, 1951

	Rodents	Burrows	Fleas*	Lice	Ticks	Animals Inoc.	No. Positive	Total Spec.	No. Tissues	No. Positive
Plague Studies Santa Fe, New Mexico	255	0	1413	0	157	133	0	127	1	0
New Mexico State Unit	2389	0	3797	0	202	207	0	197	0	0
Washington State Unit	1460	0	3282	0	0	33	5	18	0	0
Total	4104	0	8492	0	359	373	5	342	1	0

* All fleas were identified before inoculation.

TABLE 6

produced young in this quarter. Young ground squirrels remained active into November while the adults entered hibernation earlier, none being captured after October 4. Peromyscus maniculatus was, in this period, the widest ranging rodent studied. Several individuals of other species moved considerable distances to new homes.

The two species of kangaroo rats comprised slightly over one-half of the individuals taken and two-thirds of the total captures. They were captured an average of 3.6 times per individual.

The prairie dog colony under study on the St. Michael's College Campus became inactive in early October apparently as a result of hibernation. None was trapped after September and none was seen after the first few days of October.

All parasites removed from the mammals captured in one week of each month are sent to the Plague Laboratory in San Francisco for bacteriological examination for plague and tularemia organisms. The examinations have been negative for the 116 pools of ectoparasites collected during this quarter.

To date, 20 different species of fleas have been recognized in collections from mammals taken at the airport study area. Mites, ticks, and lice have been collected and preserved pending opportunity for obtaining specific determinations. Preliminary tabulation of flea records are beginning to indicate trends in seasonal abundance and information regarding degree of interchange between different species of hosts. Representative samples of all ectoparasites are being mounted and preserved on slides.

By use of the modified Berlese funnel, large numbers of arthropods have been recovered from material excavated from wood rat burrows and one burrow of Dipodomys spectabilis. The study of rodent burrows is intended to determine seasonal changes in arthropod associations found in representative burrows, and to provide data on ectoparasite populations on individual mammals for comparison with populations found in the same animal's burrow.

Hawaii Field Station

A significant development in regard to the proposed plague investigations on the Island of Hawaii was the designing of a combination Warfarin-DDT-Bait Box by Sanitary Engineer (R) R. P. Lonergan. In the preliminary agreement establishing the project as a cooperative venture between CDC and the Territorial Health Department, it was recognized that there were four obvious difficulties involved in using conventional methods of distributing DDT in this sugar-cane growing area: 1) Would DDT reach the rat's habitat in dense cane-fields and gulches?; 2) Would DDT destroy predatory insects imported at considerable expense to combat cane pests?; 3) Would DDT be likely to end up as part of the raw sugar product?; and 4) Would the humid, rainy climate inactivate DDT in a short time? The Lonergan Bait-Box presents a method which may

Trapping Summary for the Airport Study Area

Santa Fe, New Mexico

October - December, 1951

Species	October		November		December	
	Individuals	Captures	Individuals	Captures	Individuals	Captures
Ord's Kangaroo rat	74	171	86	157	69	111
Banner tail Kangaroo rat	57	152	41	87	29	52
Baird's pocket mouse	40	57	37	52	30	41
Wood rat (2 species)	12	32	9	20	9	15
Deer Mouse	9	22	9	15	11	13
Large-eared deer mouse	6	10	5	10	4	4
Grasshopper mouse	10	16	4	7	1	1
Harvest mouse	5	5	5	6	1	1
Spotted ground squirrel	9	23	4	9		
Cottontail	7	7			1	1
Total	229	451	200	363	155	239

TABLE 7

overcome these four difficulties. It uses the rat as the distributor of DDT to reach its habitat; it protects the DDT from the elements; it minimizes the danger of destroying beneficial predatory insects; and it decreases the possibility of DDT becoming part of the raw sugar product. In addition, it presents a combination method of rodent reservoir as well as ectoparasite vector control in order to break the plague infection chain.

On December 4, 1951, S. A. Scientist Leo Kartman and San. Eng. (R) R. P. Lonergan were transferred to Honokaa, Hawaii, via Honolulu where a series of conferences was held in regard to initiation of the study project. Discussions took place at the Territorial Health Department and the Hawaiian Sugar Planters' Association Experimental Station. It was agreed that Dr. Kartman and Mr. Lonergan would proceed to Honokaa, familiarize themselves with the area and review previous control operations. When this preliminary work was completed, they were to present a protocol describing operations they desired to undertake concerning: 1) the field testing of the Lonergan Bait-Box on a modest scale; and 2) the study of rodent-ectoparasite ecology.

This plan of activities and all future expansion or major changes in objectives or methods is to be subject to prior approval by CDC, the Territorial Health Department, The Territorial Department of Agriculture and Forestry, the Hawaiian Sugar Planters' Association Experimental Station, and the plantation managers concerned.

Plague Laboratory

Entomological: Over 10,000 ectoparasites (Siphonaptera) received from Federal, State, and City projects conducted by or in cooperation with this station were identified as to genus and species. One new species from the Santa Fe Field Station will be described for publication. Studies were continued on the revision of the Genus Malaraeus.

Bacteriological: The bacteriology laboratory has had difficulty in the past in demonstrating Pasteurella pestis when Salmonella and certain other organisms are present. Overgrowth of these organisms masks the presence of P. pestis. The isolation of P. pestis from animal tissues, experimentally infected with a 24-hour broth culture containing P. pestis and S. typhimurium or S. enteriditis, has been unsatisfactory when blood tryptose agar plates are used. Preliminary observations on the above medium containing an optimal concentration of thallium sulfate, magnesium sulfate, and glucose show encouraging results. The latter medium may be superior to blood tryptose agar for the isolation of P. pestis. Further studies are being conducted to incorporate the blood tryptose agar containing metallic salts and glucose as routine plating medium for the isolation of P. pestis.

Bacteriological examinations were made of routine specimens of tissue and ectoparasites collected in the search for Plague foci and in the surveillance of formerly plague-infected port cities.

Some time was devoted to bacteriological study of rodents, rodent feces, and insects in connection with human cases of Salmonellosis in San

Francisco.

Routine bacteriological examinations and animal inoculations were performed for the U. S. Public Health Service Hospital, the USPHS Regional Office, and other Federal Agencies.

The above mentioned activities are summarized in Table 8.

RODENT CONTROL AND INVESTIGATIONS

Typhus Control Activities

Recent surveys show that, even though the number of reported human typhus cases has been reduced, the disease still remains in a large area of Southeastern United States and a small area in Southern California. Reported human typhus cases in nine Southeastern States, January through August, have declined from 2882 in 1944 to 465 in 1950 and 284 in 1951.

The percentage of rat-infested premises with typhus-positive rats has declined. Recent inspections made following control operations show almost complete lack of typhus-positive rats in cities and a very low percentage of positive premises in rural areas.

On the Oklahoma program, a manuscript has been completed on Oriental rat flea infestation of domestic rodents and the distribution of murine typhus fever among the domestic rats. Forty-eight meetings were held with a total of 1,220 in attendance. Five hundred and fifteen sanitarians spent an average of 6 hours each in on-the-job training in domestic rodent control.

A study of the effects of DDT dusting and supplementary control measures reveals a reduction of infection in rats from 31-40 per cent in untreated areas to 5-6 per cent in treated areas. Newer rodenticides may make possible even further reductions. State and local agencies contributed 84 per cent of the total man-hours used on the typhus control program during the quarter. Fourteen ratproofing projects were in operation and 699 establishments were ratproofed. Operations are summarized in Tables 9 and 10.

Plague Ecology

Various phases of plague ecology investigations made in Texas from 1947 to 1949 are still being summarized for publication. The effect of cultivation on the existence and migration, or drift, of plague in native wild rodents was most recently summarized. In West Texas, where prairie dog colonies are good indicators of the presence of plague, some 60 colonies were kept under observation in 9 counties in West Texas. Observation of these was supplemented by observations on packrat and grasshopper mouse populations, also good indicators.

All prairie dog colonies which were extinct or showed definite signs or die-off during the two-year period of observation, were in a large uncultivated area extending some hundreds of miles northward, westward

TABLE 8

SUMMARY OF MISCELLANEOUS BACTERIOLOGICAL EXAMINATIONS

October - December, 1951

Bacteriological Examinations	No. Spec.	No. Exam.	No. Pos.	No. Neg.
Water				
Federal Prison Camps	20	20	11*	9
National Park Service	16	16	1*	15
Indian Service	4	4	0	4
U. S. Maritime Commission	4	4	0	4
U. S. Coast Garde Service	6	6	4*	2
U. S. Airlines Flights	17	17	2*	15
	67	67	18	49
Ascheim-Zondek Tests				
U. S. Marine Hospital	11	11	7	4
Tuberculosis				
U. S.Marine Hospital	11	11	1	10
Plague				
G. P. tissues	5	5	5	0
Rat Tissue	1	1	0	1
Salmonella				
Mouse feces	4	4	0	4
Rat feces	2	2	0	2
Squirrel feces	1	1	0	1
Rat tissue	1	1	0	1
Cocroaches	1	1	0	1

* Results of water specimens found to be positive were based on observations from confirmation test.

and southwestward. Prairie dog colonies which, on the other hand, were in small natural areas (from a few acres up to 60 odd square miles) enclosed by cultivated fields, even though only a quarter-mile across, showed no evidence of die-off. (Figure 4). Neither did packrats or other native wild rodents exhibit signs of die-off.

It is concluded that, where the mammal and bird fauna are similar to that in West Texas, cultivated areas are very effective buffers against the drift of native wild rodent plague into small areas which otherwise appear quite suitable for its existence. It is also concluded that the predatory mammals and birds were not very effective in introducing plague from large areas into smaller areas. At the same time, this evidence does not deny that they could be effective in facilitating the drift within large uncultivated areas.

Tularemia Investigations

A seasonal study of the incidence of tularemia in relation to ticks biting humans in the Arkansas area has just been completed. Data are being compiled concerning the density, distribution, hosts, seasonal activity and habitat relations of ticks in general. Plans are being formulated to continue the investigations during the coming summer.

Rodent Control Demonstrations

The activities of the Rodent Control Specialists in the twenty states participating in cooperative city rodent control during the quarter consisted of survey work, anti-rat sanitation, training, promotion, conferences, ratproofing and poisoning. A summary of activities is contained in Tables 9 and 10.

Two cities, Springfield, Ohio and Lewiston, Idaho, passed ordinances requiring ratproofing of business buildings. Further progress is being made on anti-rat sanitation activities.

THOMASVILLE FIELD STATION

Dysentery Studies

Primary among activities for the quarter were fly ecology studies, analysis of the past season's results, and the planning of field studies for the 1952 season. As previously reported, the sanitational studies conducted during the 1951 season were highly encouraging and similar studies will constitute a major part of the field research during the coming year.

Corroborative evidence was obtained during the 1951 season strongly supporting earlier data showing a marked reduction in Shigella infection rates due to fly control. Rates for 1951 were approximately equal in both groups (treated vs. untreated) of towns used in the 1949 and 1950 studies, indicating that previous differences were not characteristic of the towns irrespective of fly control activities. Shigella infection rates for the entire period are shown in Table 11. During the same 1949-1951 period the Shigella infection rates in the rural towns remained considerably higher than

TABLE 9

TIME AND PERCENTAGE OF WORK DEVOTED TO MURINE TYPHUS AND RODENT CONTROL

September, October and November, 1951

	Murine Typhus		Rodent Control	
	Man-Hours	% of Total Time	Man-Hours	% of Total Time
State and Local	86,006	84	59,653	81
Public Health Service	16,920	16	14,160	19
Total	102,926	100	73,813	100
	% of Total Time		% of Total Time	
State and District Supervision, Shop and Entomological Service (PHS)	9		5	
State and District Supervision (State and Local)	8		1	
Antirat Sanitation Activities	10		24	
Residual DDT Dusting	9		1	
Evalustion Activities	9		31	
Ratproofing	12		3	
Maintenance of Ratproofing	2		1	
Rat Poisoning and Gassing Operations	34		12	
Surveys	1		6	
Training and Exucational Activities	5		15	
Miscellaneous and Leave	1		1	
Total	100		100	

TABLE 10

TYPHUS AND RODENT CONTROL ACTIVITIES

September, October and November, 1951

	Murine Typhus Control	Rodent Control
Number of Meetings	48	103
Number in Attendance	1,220	1,202
Number of persons on-the-job Training	515	297
Average Man-hours per Trainee	6	22
Cities with Ratproofing Projects	14	7
Establishments Ratproofed	699	498
Counties with Poisoning Projects	70	26
Establishments Poisoned	62,812	4,804
Counties with Dusting Projects	62	
Premises Dusted: Urban	16,953	
Rural	4,940	
TOTAL	21,893	

in the city of Thomasville. This difference is believed to be due primarily to a proportionately greater opportunity for fly contamination with the infectious organisms from insanitary privies in the rural towns.

The patterns of insecticide resistance acquisition and maintenance in wild house fly populations in study areas are becoming evident. All house fly populations in the entire area have shown a basic recognizable resistance to DDT irrespective of whether or not insecticides are known to have been used against them. In two towns dieldrin sprays alone were used until the house fly resistance to dieldrin made them impracticable. No DDT was used yet resistance to DDT steadily increased during the period of dieldrin usage. Dieldrin resistance remained high for the remainder of the season, yet DDT resistance dropped steadily during the period after dieldrin usage stopped. In one town one application of DDT was made followed by BHC while in the other town BHC alone was used following the dieldrin. In towns where DDT had been used in quantity the resistance to DDT did not diminish to nearly as great degree after its use was terminated. This is an instance of an apparent acquisition of DDT resistance from the use of dieldrin which is believed to be a function of the active selection for dieldrin resistance and not an integral part of such resistance, since the dieldrin resistance remained undiminished in the population and DDT resistance dropped. Dieldrin resistance in towns treated in 1950 remained high throughout 1951. DDT resistance in the same towns remained at a sufficiently high level to preclude its reuse.

Studies of fly ecology, particularly of house fly ecology, have continued with emphasis upon changes in habits and associations apparently resulting from insecticide resistance. Most notable of such possible changes is an increased tendency for insecticide resistant house flies to breed in privy pits. Such a change of habit could easily increase the probability of fly contamination with enteric organisms. It also increases the desirability of finding economically feasible methods of excluding flies from human feces, a research problem of high priority for the coming season.

Eye-Gnat Conjunctivitis Studies

The routine trapping of adult gnats was continued through the last week of October when the nurse officer made her final round of visits in the conjunctivitis study. Analysis of the gnat catches has been delayed in order to study the possibility of estimating the numbers of Hippelates pusio from the weights of whole collections. The survey of conjunctivitis incidence, which included physical examinations and histories but no bacterial culturing, is being analyzed to determine the frequency of various signs and symptoms of the disease.

During the past season, 40 collections were made of the gnats attracted to man (20 collections) and other animals (dog, 3; cow, 10; hog, 7). Only 7 bishoppi were taken along with 1823 pusio, and all of these specimens were collected from cow or hog with a net rather than an aspirator. It is possible that the occurrence of bishoppi in these

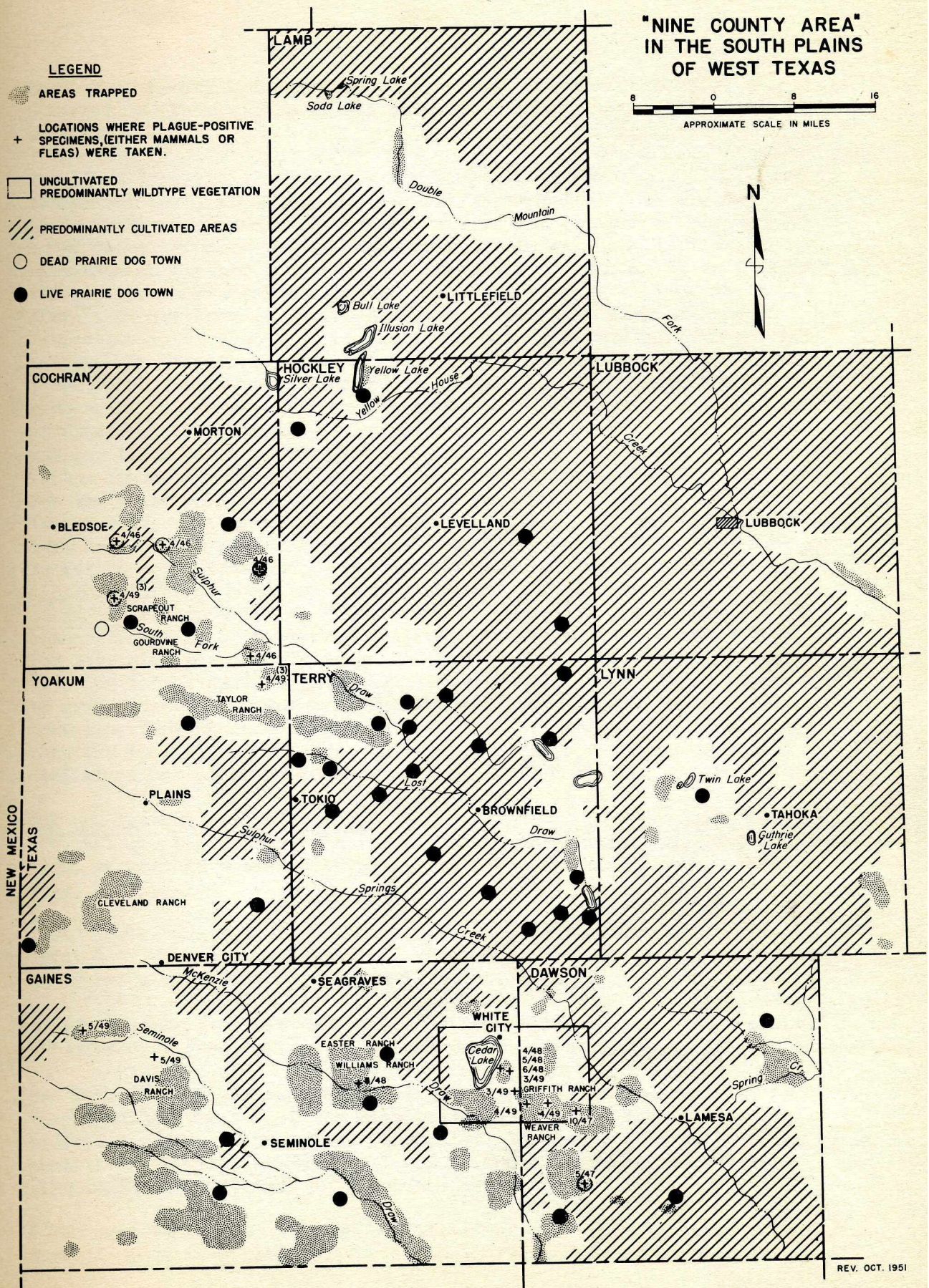


Figure 4

FSA-PHS-CDC

ATLANTA, GA. MAY 1950

catches is accidental and perhaps due to the attractiveness of decaying material in the vicinity of the animals rather than the animals themselves.

The first larviciding test with benzene hexachloride (5 pounds of gamma isomer per acre) showed such clear-cut control that just before the end of September the same half-acre plots were reharrowed and the recovery traps reset to study the effectiveness of the same application of insecticide on another generation of gnats. From October 15 to November 5, 202 pusio were recovered from the untreated plot and 4 from the treated. Since the corresponding figures for the first test were 424 and 1, respectively, it appears that there was little loss of insecticidal action. On the other hand, the number of gnats found in the separate traps on the untreated plot were so variable in both tests that the percent of reduction could not be accurately determined. An explanation of this great variability is believed to have been found in a study of the occurrence of Hippelates dissidens as well as H. pusio in relation to the amount of exposed vegetation under the traps. This was estimated for the traps on the untreated plot in both tests, and in the second test the vegetation was also sifted and weighed. If the not inconsistent figures for medium amounts of vegetation are omitted, the average number of pusio is found to be greater with the least vegetation and of dissidens greater with the most. The differences in the average numbers of pusio are probably not related to the amount of potential food in the soil, but indicate rather that where there was the least vegetation, the harrowing was more thorough and the soil more suitable for oviposition and larval development. In respect to dissidens, larger amounts of grass seemed to offer a more favorable environment. It is believed that more thorough and uniform preparation of the soil will make it possible to test insecticides in smaller plots and perhaps with a smaller number of traps.

Rat and Rat-Ectoparasite Studies

Rat ecology studies have continued with 58 additional rats live trapped, bled, marked and released bringing the total number of marked rats to 164.

Three farmsteads have been located with typhus positive rats, several of which have been trapped more than one time. This indicates that foci of typhus persist in the treated counties.

No movement of rats between farms has been detected and there is good evidence that feral colonies of rats do not exist in southwest Georgia.

The 1951 late summer and early fall rat typhus survey showed for the three months: 23.45% of the rats positive in Grady County, 0.89% positive in Thomas County and 0% positive in Brooks County. Flea numbers are still considerably lower in the two treated counties (Thomas and Brooks) than in untreated Grady County.

A rat prevalence survey based on a total of 200 urban or rural properties, made by questionnaire, in the three-county area has shown a

reduction of rat-infested sites since 1946 to be 32% in Thomas County, 20% in Brooks County and 47% in Grady County. Rat control seems not to have been the factor responsible for this reduction and Warfarin has been used so little as to be beyond consideration.

The reporduction and longevity study of X. cheopis has continued at a very slow rate since cooler weather. It has taken nearly twice as long for the establishment of each new-generation as it did in the summer months.

The cotton rat has proved a highly efficient host for X. cheopis under laboratory conditions.

Epidemiological Studies

Diarrheal Disease: Anal swab cultures were collected from 2041 children under 10 years of age for the isolation of Shigella and Salmonella organisms. Of these 43 (2.1%) were positive for the recognized Shigella pathogens, and 16 (0.78%) were positive for Salmonella.

All the human culture data collected since culturing began in April 1949 to the present date have been tabulated and are being analyzed. Table 11 shows the number of anal swab cultures collected from children under 10 years of age and the number of isolations of pathogenic Shigella organisms and Salmonella organisms by each year of the study.

Table 11
Positive rectal swab cultures for Shigella pathogesn and Salmonella in children under 10 years of age.
April 1949 - January 1952

Year	Number cultures	Positive Shigella		Positive Salmonella	
		Number	Percent	Number	Percent
1949	7,863	142	1.80	24	0.30
1950	10,220	151	1.47	34	0.33
1951	8,849	154	1.74	82	0.93
Total	26,932	447	1.65	141	0.52

The culturing of yard animals located in the vicinity of a human being known to carbor Salmonella organisms was continued through this quarter but is being discontinued January 1, 1952. Since October 1, 1951, 2130 yard animals were cultured with 30 (1.4%) positive being found. A summary of all yard animal cultures collected since April 1949 to January 1952 is given in Table 12 below.

Table 12
Positive rectal swab cultures for Salmonella organisms from yard animals, April 1949 - January 1952

Number cultured	Number positive	Percent
21,751	202	0.93

A study is now being done of the distribution of Salmonella organisms in children and animals in this area.

The culturing for Salmonella organisms of various parts and organs of hogs and cattle has continued at the Georgia Packing Company. Since July 1, 1951, 1100 specimens have been cultured with 32 isolations of Salmonella organisms (2.91%). In 164 raw meat specimens collected from restaurants and meat markets, 3 (1.8%) isolations of Salmonella organisms were made.

The periodic morbidity survey initiated April 23, 1951, was stopped October 1, 1951, to permit a reorganization of the method of conduct of the survey and to code the data already collected. The survey is now organized so that visits will be made every four weeks. The enumerators have been divided into teams; each team has a definite daily assignment to complete in an attempt to give continuity to the survey. The first four days of the work week are for visiting, the fifth day being set aside for call-backs, visits to areas missed because of the weather or illness and so on. A summary sheet will be completed each day of the preceding day's survey in order to give an up-to-date index of the amount of illness occurring in each community visited.

Murine Typhus Investigations: The attempt to find all cases of murine typhus fever in Brooks, Grady, and Thomas Counties has continued throughout this quarter. Leads to new cases are obtained from frequent periodic visits to all practicing physicians in the areas under observations, and from the reports of the laboratory of the Georgia State Health Department. The small number of cases disclosed continues to reflect the steady decline of the incidence of murine typhus fever.

A tentative summary of the cases found in 1951 by month of onset and by county is as follows:

Table 13
Murine Typhus Fever Cases, 1951

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Brooks Co.	0	0	0	0	0	0	0	0	0	0	0	0	0
Grady Co.	1	0	0	0	0	0	2	1	0	0	0	0	4
Thomas Co.	0	0	0	0	0	0	1	1	0	0	0	0	2

Total cases for all areas - 6

This is not a complete summary of all cases found in 1951 because there are a few convalescent serum specimens that have not been reported as yet.

Considerable speculation has risen as to whether or not the decline in the number of cases of murine typhus fever is a real decline or whether the case-finding technique is no longer adequate. The fact that the older physicians practicing in this area, all of whom are well acquainted with murine typhus fever, state they are not seeing cases now as they

did previously adds weight to the belief that the decline of the incidence of this disease is real. At the present time, no reason can be found for the decline. The rather marked decrease in the rat population, the widespread use of antibiotics and several other highly speculative reasons have been advanced as the cause.

Conjunctivitis Investigations: The conjunctivitis investigations were continued through October, 1951, as described in the report for the first quarter, FY 1952. The results of the investigations have been tabulated and are now being analyzed by age group, sex, and race.

From July 1, 1951 to November 1, 1951, 71 person-illnesses were reported or observed in the white race and 57 in the negro race, morbidity rates of 2.7 and 3.5 per cent, respectively (Table 14).

Table 14
Barwick, Conjunctivitis Survey
(July 1 - Nov. 1)

Age	WHITE Pop.	WHITE Cases	WHITE Rate%	NEGRO Pop.	NEGRO Cases	NEGRO Rate%
0-1	66	3	4.5	71	8	11.2
1-4	292	39	13.3	359	28	7.8
5-9	266	21	7.8	232	10	4.3
10-14	170	3	1.7	127	3	2.3
15-19	104	0	0	113	0	0
20 /	1680	5	0.27	689	8	1.2
Total	2578	71	2.7	1591	57	3.5

REGIONAL OFFICES

Region I

Sanitary Engineer Director Frank R. Shaw reported for duty on December 17, 1952 replacing Sanitary Engineer (R) William B. Schroeder who enrolled at Utah State College in September for a year of graduate study. Mr. Shaw serves as Assistant to the Regional Engineer and CDC Representative.

Candidates were recruited for a 12-week sanitation course, February 25-May 16, 1952 and a milk laboratory course January 28 - February 1, 1952. Disaster aid equipment assigned to the Region was checked.

Region II

New Jersey: Activities were devoted principally to promotion, aid in installation and inspection of sanitary landfills for refuse disposal. Neptune Township acquired a tractor-bullclam and a site of 100 acres and is building a storage and weighing shed. The township has a permanent population of 40,000 but summer peaks approach 300,000. Fairlawn Township is planning the reclaiming of 10 acres of freshwater marsh in

an experimental sanitary landfill. Bergen County is budgeting funds for purchase of a tractor and dragline for a sanitary landfill.

The Rodent Control Specialist continued training of Jersey City sanitarians in practical rat elimination measures with demonstrations. He also supervised warfarin poisoning of rats on a dump. Equipment and consultation were provided for the Department of Entomology, Rutgers University, in their study of rat ectoparasite indices in municipal areas of New Jersey. Ectoparasites have already been obtained from over 1000 rats taken from dumps by bulldozing and light cyanogassing of burrows. Winter activities will utilize live trapping within buildings. New York: Nassau County is conducting a series of 2-hour seminars for food-producers, the first being held in Garden City, Long Island in November with 70 attending. Two towns requested priorities for purchase of tractors and another requested a demonstration of sanitary landfill operations. The R. C. Specialist participated in the fifth of a series of six 12-week courses for State Health Department sanitarians. A 1080 demonstration was part of the rodent control training. The V. C. Specialist assisted the New York City Fumigant Board in preparing questions for a P.C.O. licensing examination.

Pennsylvania: Assistance was provided the town of Ambler in initiating a sanitary landfill in a 200-acre site adjacent to a steel mill where cinders were available for cover during wet weather when a tractor cannot easily work.

Miscellaneous: Use of chlordan for roach control was demonstrated and a report prepared on control of various pests at Ellis Island. A combined WPC-CDC report on mosquito breeding in water chestnut areas of the Hudson and Mohawk Rivers was prepared and submitted to the Army Engineers. Discussions were held with Division of Sanitation personnel relative to refuse disposal plans and Interstate Quarantine Regulations pertaining to cooking of garbage intended for hog-feeding. Thirty-three films were shown or loaned.

Region III

District of Columbia: The V. C. and R. C. Specialists presented the third 1-week course in rodent control. Seventy personnel attended, 50 of them being D. C. Health Department personnel. Refuse handling practices were shown to four Chilean engineers.

West Virginia: The V. C. and R. C. Specialists completed 2-day courses for all state sanitarians with four such courses being given in October and November. These will be followed shortly by 2-day demonstrations.

Virginia, Maryland, North Carolina: Consultation and advisory services continued toward development of better insect and rodent control program organization and guidance. Alexandria, Virginia was assisted on their multiple screening program.

Miscellaneous: Training activities were planned with the Training Officer assigned to the University of North Carolina. The V. C.

Specialist visited several landfills in Region II, obtaining useful information relative to planning a landfill in marsh areas of Alexandria. Plans were prepared for a 3-day insect and rodent control course for 150 custodial personnel of P. B. S. during February. Fifty-six rodent control films were shown or loaned.

Regions IV & V

Ohio: The R. C. Specialist has completed a state-wide survey and report all of communities of 5000 + population relative to refuse storage and disposal. Plans now call for a state publication, similar to Rat-borne Disease Prevention and Control and a series of training seminars at the district level. The Ohio Legislature enacted a law authorizing refuse collection and disposal to be provided as a county utility. This will enable small communities to join in solving their problems. Proper refuse handling is prerequisite to assistance to cities on rat control. Springfield has conformed and also has provided an ordinance and personnel for a ratproofing program. Xenia and London have sanitary refuse control programs, although high water hampered the landfill operations at London. Portsmouth requested a comprehensive rat survey and recommendations on a program, basic refuse sanitation having been established.

Michigan: The Detroit ratproofing program is accelerating with the immediate goal of completing all food handling establishments. Sub-standard housing in 42 square blocks is being razed by the re-development commission. An in-service training program for 29 Rodent Control and 12 Sub-standard Housing Section employees was in progress. A rodent control seminar by Ingham County Health Department was well-attended, including State and Detroit Health Department, and Fish and Wildlife Service (F & WS) personnel. Assistance was given to the Milan Federal Reformatory on pest control. Cluster flies were present and officials were relieved to learn of the difference in habits of cluster flies and that the problem was not due to failure of their general fly control program.

Minnesota: Field studies, in representative com unities, of the rodent-fly sanitation program have been completed by the R. C. Specialist. Plans are made for a 1-day seminar for District and State engineering personnel on March 18. The State Health Department plans to work with Junior Chamber of Commerce groups to encourage sanitation along with the Jr. C. of C.-sponsored warfarin poisoning campaigns, which are quite extensive. Morehead and Fergus Falls have inaugurated constructive programs. Plans are to cooperate with the State Agricultural Department in sanitary programs at State institutions.

Miscellaneous: In Kentucky, the integration of fly and rodent sanitation through established State and local health functions was encouraged. Plans were crystallized for assignment of Rodent Control Specialists to Indiana and to Spring field, Ohio during the next quarter. Fifty-one films were shown or loaned and there was a heavy demand for other informational material.

Region VI

The V. C. Specialist devoted the month of November to defense and military establishment surveys being prepared by the Regional office. (Reports not received for October and December activities)

Region VII

Sanitary Engineer (R) I. Bernstein was transferred to the Regional office as V. C. Specialist on October 22, 1951. The Regional CDC R. C. Specialist continued on duty.

Iowa: Accomplishments and plans of the Sanitation Committee, Sioux City Stockyards Association, concerning rodent control were received. Sanitation and use of warfarin have kept the rats well under control in the 700 acres involved.

Kansas: Rodent control activities in connection with Civil Defense and in rural areas were discussed with the State Health Department. The Wichita rat control program was reviewed and, while proceeding slowly, it should progress well because of the appointment of two new local supervisors. A revision of the ordinance was suggested to insure the repayment of the city for ratproofing work done without the necessity of court actions. Typhus has been a problem in Wichita and a survey is being considered to determine if it still is present. Vector problems were discussed with representatives of Johnson County Health Department.

Missouri: Discussions in St. Louis led to the formation of tentative plans for employment of an entomologist next year to survey the mosquito problem and develop a mosquito abatement district for the county. CDC will provide an entomologist (Harmston) for initiating the survey and training the local entomologist. Inspections were made of the PHS Hospital, Kirkwood, and the Medical Center for Federal Prisoners, Springfield. An area-wide rat control program was planned and presented before the Kansas City Stockyards Association on the same order as that at Sioux City. A talk on rat control was given at Staff meeting of District #5 Health Department at Springfield.

South Dakota: A discussion and demonstration of the emergency water purification unit were presented before 60 medical and chemistry students at South Dakota University. A short course is planned for sanitation personnel in the State next spring.

Miscellaneous: Personnel participated in meetings of the Kansas Missouri Pest Control Associations. Personnel were recruited for training courses to be held in Atlanta, Topeka, Cincinnati and Bloomington. Sanitary inspection was made of the area around Offutt Air Force Base, Nebraska. Suggestions on rodent control were offered to the Chief Sanitary Engineer of the Central Air Defense Command, responsible for 20 bases in central and southern United States. Community facilities surveys were conducted in two cities in Kansas and four in Nebraska. Sixteen films were shown with 507 attendance.

Region VIII

The V. C. Specialist was assigned to the Regional office in September, 1951.

New Mexico: The rodent and fly control and the plague investigations activities were visited and discussed with the State Sanitary Engineer. Part D-12 of the Program Review Report was completed for the State. Arrangements were made to assist in a 2-week State training program for six new Sanitarians.

Texas: Arrangements were made for the assignment of an insect and rodent control Training Officer to the State Health Department. The V. A. Center at Waco was inspected and recommendations given regarding better sanitation for fly control. Discussions on vector control were presented at the Texas Pest Control Association meeting. Operations of the Jefferson County Mosquito Abatement District were reviewed and recommendation made for more permanent control measures. The budget of the M. A. D. is over $100,000 annually. A survey was made of the vector control activities in Galveston and they were found to be operating satisfactorily. Measures include rat control with ratproofing of food handling buildings and permanent warfarin bait stations along the beach area, and mosquito and fly spraying activities in both business and residential areas.

Oklahoma: CDC programs were discussed with State health personnel. Recommendation was made that sanitation activities for rodent and fly control be combined for more efficient operation. Malaria and fly control programs operate from a revolving fund to which cities and counties contribute. Fly programs were operated in 41 communities last season. A total of 326 Korean malaria cases and 52 reported local transmissions have been investigated, none of the latter being confirmed. Enid has an active ratproofing program and the initial ratproofing is completed in Oklahoma City.

Arkansas: Operational and training activities were reviewed. Residual spray was conducted in 19 counties and malaria control larviciding in 14 cities and towns. Ratproofing, rat control and sanitation are practiced. Eight counties or cities provided clean-up and poisoning programs and typhus evaluation activities were conducted in 17 counties with 2.4% of the rats being found positive.

Region IX

Idaho: Conferences were held with the State Sanitary Engineer relative to the assignments of the two R. C. Specialists (State-wide and Lewiston) and to general rodent control problems in the State.

Montana: Mosquito control was discussed at Miles City where the problem is complicated by irrigation practices around the city.

Utah: A meeting with State Health Department and F & W S representatives was held relative to adjudication of differences between PHS and F & W S recommendations in the Weber Basin Report. Final draft of the report

was submitted to Atlanta. The rodent control problems in the State were discussed with the R. C. Specialist.

Wyoming: A 2-day rodent control training course was conducted for orientation of several employees of the Union Pacific R. R. Arrangements were made to furnish Cheyenne rodent control assistance after the transfer of the R. C. Specialist from Wyoming.

Miscellaneous: Tow meetings of the Rocky Mountain Training Center advisory committee and a meeting of the Weld County Sanitation Training Program Committee were attended as representative of the Regional office. Information on operations of approved garbage and refuse collection systems in communities less than 5000 population was obtained. Cost data on the refuse program in Colorado Springs was obtained for the community facilities program. Seven films were shown or loaned.

Region X

California: The V. C. Specialist participated in the annual Bureau of Vector Control staff conference. A new organization was established and plans for investigation of several vector problems were discussed. Findings concerning swimmers itch distribution in Washington and Oregon were presented to the B. V. C. Committee for Investigation of Swimmers Itch. Mills Field Coast Guard Base, San Francisco, was surveyed and recommendations submitted to the C. O. regarding insect and rodent infestation. A 3-day course for 25 Food and Drug inspectors was attended at San Jose. Assistance was given to the CDC Training Officer and B. V. C. on insect and rodent infestation surveys in food-processing plants. A Sanitary Engineer (State) was transferred to the B. V. C. staff to work on refuse disposal problems in the State. Information on warfarin was prepared for the Maritime Administration Office at Suisan Bay and on roach control for the Government Island Coast Guard installation.

Arizona: A program review of the vector control program of the State was completed and visits were made to the Phoenix Fly-polio Project and the Dysentery-Diarrheal Fly Control Project at Casa Grande.

Nevada: A program review of the vector control program of the State was made. Pest mosquitoes are an important problem and recent legislation enabling the establishment of mosquito abatement districts has been enacted. Garbage disposal problems are also important.

Miscellaneous: The V. C. Specialist served as PHS representative at the annual meeting of the Advisory Committee of the B. V. C. Occurrence and abundance reports of mosquito species prevalent in Lake Tahoe region were obtained for the W. P. C. Basin Engineer. The public health importance of the newer insecticides and rodenticides was discussed at a Red Cross Course.

WATER RESOURCES

River Basin Offices

Northeast: Effective November 1, 1951, the name of the New England Drainage Basins Office was changed to the Northeast Drainage Basins Office and the area now coincides with that served by the New York-New England Basins Interagency Committee.

Accomplishments through 1951 of the Public Health Insect Control Study and Report Group include: (1) Accumulation of all known published and unpublished information pertaining to diseases, vectors, and pests directly related to water and water use in the Northeast; (2) Evaluation of 50% of this information; (3)Completion of nearly all information needed for Connecticut, Rhode Island, Massachusetts, southern Maine, southern New Hampshire, and central and eastern New York, as a result of published and unpublished information and field studies made in 1951; (4) Completion of the Pawcatuck River Basin Report in December by the coordinator, copies of which were mailed to all Group Members for their review.

The program for the near future includes: (1) Completion of the identification of light trap and other field collections made in 1951; (2) Reports on several basins to be written as soon as all Group Members have approved the Pawcatuck River Basin Report for style of presentation; (3) Field studies early next spring (to locate habitats where larvae develop) and late next spring (to study adults)on mosquitoes, black flies, and punkies, in northern Maine, northern New Hampshire, Vermont, and extreme northern and western New York.

Missouri: A report on "Mosquito Investigations in the Republican River Basin" was completed and copies were sent to various Federal and State agencies for review. The report "Mosquito Records from Missouri Basin States" was transmitted to appropriate agencies. Another report on "Mosquito Investigations in the Kansas River Basin" is essentially complete with review comments or corrections being incorporated in the final draft.

Work continued on the completion of a review draft of a proposed report "Mosquito Investigations in the James River Basin." Basic data are complete and assembled charts and graphs have been received in Atlanta for processing. Circularization of the review draft of this report is scheduled for January.

Southwest-Lower Mississippi: S. A. Scientist (R) Frederick F. Ferguson was transferred to the Basin Office on November 1, 1951, for work on AWRRBIAC - CDC activities.

A greater part of the quarter was spent in tabulating data collected during the past season on insects of public health importance in the AWR area. Tabulation of the 1951 data from Oklahoma, New Mexico, and Colorado has been completed. After all of these data have been compiled, it will be possible to determine areas where additional information

should be obtained during 1952.

Pacific Northwest: At the request of the Chief of the Division of Engineering and Sanitation of the State of Washington Department of Health, the CDC officers assigned to the Basin Office conferred with the Health Officer of the Medical Division of the General Electric Company at Richland, Washington on October 5. The purpose of the visit was to discuss arrangements for a survey of mosquito problems adjacent to the city of Richland.

Activities continued during this quarter included assembling of basic entomological and epidemiological information for the Columbia River Basin, and the preparation of bibliographic abstracts and distribution and density maps.

A preliminary draft of portions of Part I of the Columbia River Basin Summary Report was sent to CDC Headquarters Office for comment. Completed portions concern primarily basic information necessary for the proper understanding of the report, criteria, and typical examples. The sub-basin reports will contain details of the respective areas. Basic information and inventories of Water Resources Development projects have been assembled and first drafts of reports for the Kootenai and Clark Ford-Pend Oreille sub-basins are practically completed.

Encephalitis Studies - Bakersfield

Encephalitis Incidence: Reports received from the California State Department of Public Health indicate that two laboratory-confirmed cases of Western equine and 11 laboratory-confirmed cases of St. Louis encephalitis occurred in man in Kern County between August 9 and October 2, 1951. Three of the 13 cases occurred in residents of Delano, outside the Kern County Mosquito Abatement District but within the Delano Mosquito Abatement District. Of the remaining 10 cases, 7 were residents of rural areas and 3 were residents of urban Bakersfield.

Veterinarians in Kern County reported a total of 13 cases of horse encephalitis with dates of onset occurring between July 4 and October 11, 1951. A brain specimen obtained from one of these horses has not yet been tested for the presence of a virus.

Entomological Studies: During the period Obtober 1 to January 3, the following mosquitoes were collected from study stations and from M. A. D. stations for virus tests:

Culex tarsalis	2,904
Culex quinquefasciatus	4,978
Anopheles franciscanus	200
Culiseta inornata	17
Culex stigmatosoma	1
Total	8,100

During the quarter, regular collections were made at 2-week intervals from the study stations. The number of Culex tarsalis decreased rapidly

in the course of the period. Also, this species virtually ceased feeding by the end of October. In contrast, the number of C. quinquefasciatus in shelters remained high, and engorged specimens were encountered in relatively large numbers up to the end of December.

Laboratory colonies of Culex tarsalis, stigmatosoma, and quinquefasciatus, which had been maintained since May, were allowed to die out. It was noted that females of the first two species refused to feed on chicks as the weather became cooler. Inasmuch as earlier attempts to colonize C. tarsalis indoors were not successful, no attempt was made to move the C. tarsalis colony inside the laboratory. In November, however, it was decided to carry on further studies on the transmission of St. Louis virus by C. quinquefasciatus, and a new colony of this species was readily established indoors.

Acarological studies: The original colony of Fonsecaonyssus (= Liponyssus) sylviarum and a subsequently colonized strain from the same source were maintained. While both colonies became contaminated with tyroglyphid mites during the previous quarter, the tyroglyphids were apparently eliminated from the original strain as none was noted through four serial sub-colonizations in as many months. The same techniques were initiated to eliminate the tyroglyphids from the subsequently colonized strain. Two further experiments with slightly modified techniques were performed using the uncontaminated strain of F. sylviarum to test the capacity of this mite to transmit the W. E. encephalitis virus to young chicks.

Annual serological survey of domestic fowl: During late October and early November, 90 chicken bloods were obtained from representative location in the study area, including urban, semi-urban, and rural areas. Serological tests for encephalitis antibodies will be made at a later date.

State Activities

California: In accordance with a clarification of mosquito control responsibilities of the Bureau of Reclamation in connection with the development of water resources in California by that Agency, and with agreements reached at a conference with Bureau of Reclamation personnel in Sacramento on November 8, plans are being developed which will lead to a definite cooperative mosquito control program between the Bureau of Reclamation and the State Department of Public Health, with the assistance of the U. S. Public Health Service. Accordingly, the health agency will assume responsibility for the surveillance and the Bureau of Reclamation for the actual control operations. These plans call for the submission of mosquito control reports on the major units of the Central Valley Project prior to the beginning of the critical mosquito production season with follow-up reports containing control recommendations on specific problems throughout the season. Water resources development projects proposed and under construction will be investigated and kept under surveillance, and recommendations will be made to the responsible agencies as indicated.

The Regional Office of the Bureau of Reclamation in Sacramento was visited in December for the purpose of obtaining additional data on existing and planned projects for use in preparing mosquito control reports, and in evaluating potential problems resulting from the construction of planned projects. New project plans were secured for the Cachuma Unit of the Santa Barbara County Project, and the Solano County Project. Major oversights in the planning and construction of reservoirs and canals which result in mosquito sources, and the importance of considering mosquito prevention measures during the planning stage were discussed with representatives of the Operational, Maintenance and Project Planning Divisions.

During the last week of December the Fresno District Office of the Bureau of Reclamation was visited and the recommendations for eliminative work on Millerton Lake (Friant Reservoir) were reviewed. The Maintenance Engineer of the Friant Branch accompanied CDC - SDPH representatives on an inspection tour of the lake area, at which time observations were made of the work completed, and plans for accomplishing the additional work required were outlined. Representatives of the National Parks Service and California State Department of Fish and Game were also conferred with in regard to their interests in the project.

A description of agricultural drainage methods and structures was prepared for the Merced County Water Conservation Committee for inclusion in a brochure which is being prepared for distribution to farmers in the area. The final draft of the Mosquito Control Report for the proposed De Luz Reservoir (Santa Margarita River) was transmitted to the Corps of Engineers through the California and Great Basins Drainage Basins Office.

North Dakota: Early in the quarter, the V. C. Specialist discontinued the ecological studies on pot holes. These studies are of particular significance since pot holes comprise the greatest surface area of water in North Dakota. Identified larvae from these sources included Culex tarsalis and Culiseta inornata. Identification of mosquito light trap collections from various communities in North Dakota reveal that the three most common species are Culex tarsalis, Aëdes vexans, and Culiseta inornata.

The V. C. Specialist gave a seminar and lecture on the cooperative Federal-State mosquito control program at the North Dakota Agricultural College.

Mitchell Field Station

A preliminary progress report was submitted on "The Cooperative Mosquito Control Investigations at the Angostura Irrigation Project, Hot Springs, South Dakota" prior to a conference between the Bureau of Reclamation and the Public Health Service which was arranged for November 20, 1951 at Hot Springs. It is believed that, through this cooperative demonstration project and the field conference, the cooperating agencies will become more cognizant of the many mosquito problems associated with water development projects.